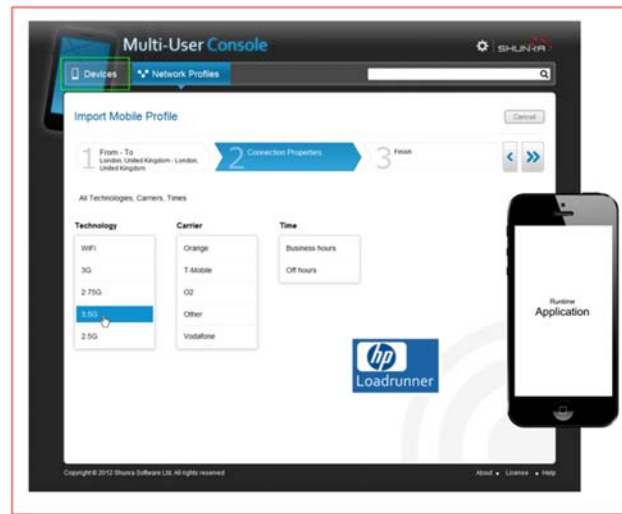


# EXHIBIT 5

**Claim 1, U.S. Pat. No. 9,298,864**

<b>Claim Element</b>	<b>Evidence of Infringement</b>
<p>A system for <b>testing an application</b> for a mobile device comprising:</p>	<p>The Accused System (including HP LoadRunner, HP Performance Center, Shunra Network Virtualization, HP Network Virtualization engine, HP Network Virtualization for Mobile, HP Network Capture, and/or any Micro Focus products related to any of the foregoing) is a system for testing an application for a mobile device.</p> <p>“HP LoadRunner and HP Performance Center with Shunra Network Virtualization</p> <p>Improve the performance of mobile apps through effective <b>testing</b>...Shunra Network Virtualization, which integrates seamlessly into HP LoadRunner or Performance Center, enhances <b>test accuracy</b> by incorporating real-world network conditions into the load and performance test environment, ensuring that the <b>test results are more reliable and accurate</b>...The combination of HP LoadRunner or Performance Center and Shunra Network Virtualization is the path to robust, reliable, and accurate <b>mobile performance testing</b>.”</p> <p><b>HP LoadRunner and HP Performance Center with Shunra Network Virtualization, Page 1-3, Ex. A.</b></p> <p>“Built on the HP Network Virtualization engine, HP Network Virtualization for Mobile bridges the gap between development and deployment by <b>enabling your mobile application development team</b> to fully and accurately assess the behavior and impact of the network on <b>mobile apps</b> before they are introduced to end users. By virtualizing real-world mobile network conditions within <b>testing environments</b>, your test results are more reliably predictive of how an <b>application</b> will behave for end users.”</p> <p><b>HP Network Virtualization for Mobile, Page 2, Ex. B.</b></p> <p>The annotated image below illustrates the user interface for the LoadRunner platform, a system for testing an application for a mobile device.</p>

**Claim 1, U.S. Pat. No. 9,298,864**

software configured to simulate, via one or more profile display windows, a plurality of network characteristics indicative of performance of the mobile device when executing the application;

The Accused System includes software [e.g., LoadRunner] configured to simultaneously visually simulate, via one or more profile display windows [e.g., the window highlighted in green in the annotated image below], a plurality of operator network characteristics [e.g., communication technology such as 2.5G, 3.5G, WiFi, etc.] indicative of performance [e.g., the communication technology corresponds to bandwidth availability indicative of performance] of the mobile device when executing the application. Communication technology options are shown in the highlighted green box in the annotated image below.

**Claim 1, U.S. Pat. No. 9,298,864**

“HP Network Virtualization for Mobile allows tests to be managed and results analyzed from any laptop or Wi-Fi-connected mobile device. The software can import **real-world mobile network profiles** captured by HP Network Capture or provided by the HP Network Virtualization Library of mobile and broadband network conditions.”

**HP Network Virtualization for Mobile, Page 2, Ex. B.**

“Because mobile network conditions are dynamic and vary by carrier, location, and time of day, it is essential for testing environments to accurately recreate multiple mobile network scenarios in order to analyze app performance and determine how network conditions affect different mobile users. The multi-flow capability in HP Network Virtualization for Mobile allows you to define a mobile test scenario that simultaneously emulates multiple user locations, each with its own unique set of virtualized mobile network conditions.”

**HP Network Virtualization for Mobile, Page 4, Ex. B.**

As illustrated below, each of the communication technology options has a corresponding network profile, which include a plurality of network characteristics.

“**Network Profiles . . . Profiles define the conditions for the test.** They can be based on Shunra’s™ Global Library recordings, or can be set manually. . . . The imported **profiles** are **recordings of mobile conditions between two points.** These recording files are stored in the Shunra Global Library which is a regularly updated, pre-populated set of more than 15 million recorded real-world data points of **point-to-point network conditions** recorded around the world. . . . You can manually define specific

**Claim 1, U.S. Pat. No. 9,298,864**

network conditions for an individual test and then save the **Profile** to be used in other tests.

To import a **Profile**:

1 In the **Network Profiles** tab the following general profiles are displayed (these profiles are already imported and do not require Internet access):

**3G:** latency 75 ms, download 780 Kbps, upload 330 Kbps, packet loss 0%

**Edge:** latency 200 ms, download 100 Kbps, upload 100 Kbps, packet loss 0%

**LTE:** latency 40ms, download 10,000 Kbps, upload 7500 Kbps, packet loss 0%

**DSL:** latency 25ms, download 2000 Kbps, upload 256 Kbps, packet loss 0%

**100% Loss:** latency 0 ms, download 10000 Kbps, upload 10000 Kbps, packet loss 100%

**Very Bad Network:** latency 500 ms, download 1000 Kbps, upload 1000 Kbps, packet loss 10%”



**HP Network Virtualization for Mobile, Shunra vCat for Mobile Manual, Pages 19-20, Ex. C.**

“HP Network Virtualization for Mobile is the only network virtualization solution designed specifically for the unique requirements of mobile app testing. Based on technology acquired from Shunra, this field-proven HP solution reduces the risk of poor mobile performance and helps your organization test, validate, and optimize the performance of your mobile apps before deployment.”

**HP Network Virtualization for Mobile, Page 1, Ex. B.**

“Built on the HP Network Virtualization engine, HP Network Virtualization for Mobile bridges the gap between development and deployment by enabling your mobile application development team to fully and accurately assess the behavior and impact of the network on mobile apps before they are introduced to end users. By virtualizing real-world mobile network conditions within testing

**Claim 1, U.S. Pat. No. 9,298,864**

environments, your test results are more reliably predictive of how an application will behave for end users.”

**HP Network Virtualization for Mobile, Page 2, Ex. B.**

wherein the network characteristics are based on data of interaction with networks in non-simulated environments.

“Network Profiles . . . **Profiles define the conditions for the test.** They can be based on Shunra’s™ Global Library recordings, or can be set manually. . . . The imported profiles are **recordings of mobile conditions between two points**. These recording files are stored in the Shunra Global Library which is a **regularly updated, pre-populated set of more than 15 million recorded real-world data points of point-to-point network conditions recorded around the world.** . . . You can manually define specific network conditions for an individual test and then save the Profile to be used in other tests.”

**HP Network Virtualization for Mobile, Shunra vCat for Mobile Manual, Page 19, Ex. C.**

The screenshot displays a configuration interface for network testing. At the top, there are three numbered steps in a sequence: 1. From - To (Tel Aviv, Israel - Tokyo, Japan), 2. Connection Properties (highlighted in blue), and 3. (partially visible). Below the steps, a filter bar indicates 'All Technologies, Carriers, Times'. Three dropdown menus are shown: 'Technology' with options WiFi, 3G, 2.75G, 3.5G, and 2.5G; 'Carrier' with options Other and Orange; and 'Time' with options off work and work.

“Micro Focus Network Virtualization Network Performance Testing

**Capture and emulate real-world network conditions**, so you can execute network performance testing to detect and remediate issues before app deployment.

**Claim 1, U.S. Pat. No. 9,298,864**

**Discover and capture**

Discover and capture live network performance conditions—such as latency, packet loss, bandwidth limitation and jitter—and recreate those conditions for network performance testing.”

**Micro Focus Network Virtualization Website, available at <https://software.microfocus.com/en-us/products/network-virtualization-for-load-testing/overview>**

“Network Virtualization software allows you to discover and capture real-world network performance conditions from your production network, recreate network conditions in your lab during application testing, and optimize the applications to improve performance before you deploy into production.”

**Micro Focus Network Virtualization Data Sheet, Page 1, Ex. D.**

“Use Network Capture to record and identify application performance problems occurring at a remote location, by measuring network conditions such as latency, packet loss, bandwidth availability across any given network topology. Network Capture can measure production links around the globe for a duration of up to one month.”

**HP Network Capture User Guide, Page 6, Ex. E.**

“HP LoadRunner and HP Performance Center mobile testing protocols enable comprehensive performance testing of mobile applications for most mobile platforms—Android, iPhone®, Windows®, and others. Using the mobile protocols, the performance testing team is able to capture mobile traffic and generate realistic mobile load on the system under test.

Features and benefits...

Shunra Network Virtualization enables an effective engineering methodology for application performance, providing the capabilities to discover real-world network conditions, virtualize those conditions in the test environment, analyze test results to isolate potential bottlenecks, and automatically deliver custom performance optimization recommendations. It provides:

NetworkCatcher: The ability to automatically gather real-world network conditions, collecting interval statistics that include bidirectional bandwidth, latency, jitter, and packet loss conditions

**Claim 1, U.S. Pat. No. 9,298,864**

	<p>Global Library: Access to Shunra’s Global Library of mobile and broadband conditions provides up-to-date average, best-case, and worst-case network conditions from thousands of cities worldwide.”</p> <p><b>HP LoadRunner and HP Performance Center with Shunra Network Virtualization, Page 2-3, Ex. A.</b></p>
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**Claim 2, U.S. Pat. No. 9,298,864**

Claim Element	Evidence of Infringement
<p>The system of claim 1, wherein the software is further configured to <b>capture network profiles from a plurality of geographical locations</b>.</p>	<p>The software is further configured to enable a user to select from one or more network conditions for testing the mobile application.</p> <p>“Micro Focus Network Virtualization Network Performance Testing</p> <p><b>Capture and emulate real-world network conditions</b>, so you can execute network performance testing to detect and remediate issues before app deployment.</p> <p><b>Discover and capture</b></p> <p><b>Discover and capture live network performance conditions—such as latency, packet loss, bandwidth limitation and jitter—and recreate those conditions for network performance testing.”</b></p> <p><b>Micro Focus Network Virtualization Website, available at <a href="https://software.microfocus.com/en-us/products/network-virtualization-for-load-testing/overview">https://software.microfocus.com/en-us/products/network-virtualization-for-load-testing/overview</a>.</b></p> <p>“Network Virtualization software allows you to discover and <b>capture real-world network performance conditions from your production network, recreate network conditions in your lab during application testing</b>, and optimize the applications to improve performance before you deploy into production.”</p> <p><b>Micro Focus Network Virtualization Data Sheet, Page 1, Ex. D.</b></p> <p>“Network Profiles</p> <p>Profiles define the conditions for the test. They can be based on Shunra’s™ <b>Global Library recordings</b>, or can be set manually.</p> <p>The imported profiles are <b>recordings of mobile conditions between two points. These recording files are stored in the Shunra Global Library which is a regularly updated, pre-populated set of more than 15 million recorded real-world data points of point-to-point network conditions recorded around the world.</b>”</p> <p><b>HP Network Virtualization for Mobile, Shunra vCat for Mobile Manual, Page 19, Ex. C.</b></p> <p>“Use <b>Network Capture to record and identify application performance problems occurring at a remote</b></p>

**Claim 2, U.S. Pat. No. 9,298,864**

location, by measuring network conditions such as latency, packet loss, bandwidth availability across any given network topology. Network Capture can measure production links around the globe for a duration of up to one month.”

**HP Network Capture User Guide, Page 6, Ex. E.**

“HP LoadRunner and HP Performance Center mobile testing protocols enable comprehensive performance testing of mobile applications for most mobile platforms—Android, iPhone®, Windows®, and others. Using the mobile protocols, the performance testing team is able to capture mobile traffic and generate realistic mobile load on the system under test.

Features and benefits...

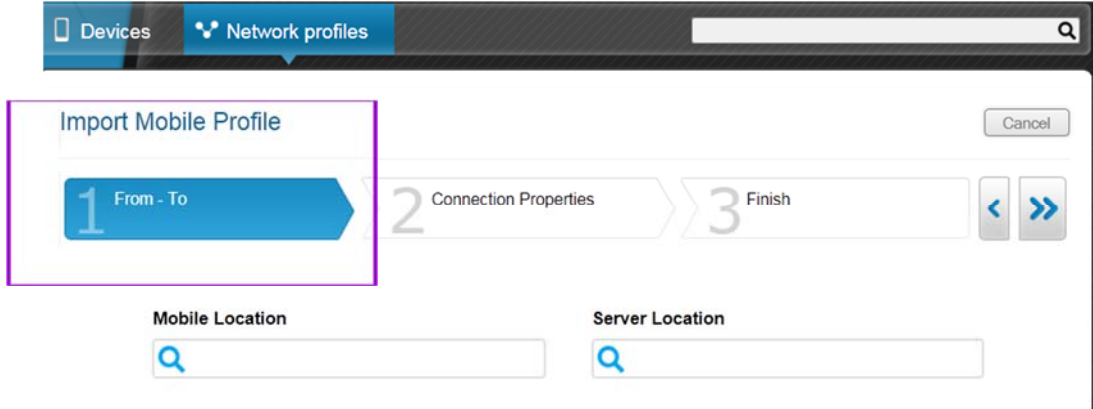
Shunra Network Virtualization enables an effective engineering methodology for application performance, providing the capabilities to discover real-world network conditions, virtualize those conditions in the test environment, analyze test results to isolate potential bottlenecks, and automatically deliver custom performance optimization recommendations. It provides:

**NetworkCatcher:** The ability to automatically gather real-world network conditions, collecting interval statistics that include bidirectional bandwidth, latency, jitter, and packet loss conditions

**Global Library:** Access to Shunra’s Global Library of mobile and broadband conditions provides up-to-date average, best-case, and worst-case network conditions from thousands of cities worldwide.”

**HP LoadRunner and HP Performance Center with Shunra Network Virtualization, Page 2-3, Ex. A.**

**Claim 3, U.S. Pat. No. 9,298,864**

Claim Element	Evidence of Infringement
<p>The system of claim 2, wherein the network profiles can either be saved in a storage medium, or stored on a server, or both.</p>	<p>As illustrated below, the network profiles can be saved on a storage medium [e.g., MySQL] or on a server.</p> <p>“Network Profiles</p> <p>Profiles define the conditions for the test. They can be based on Shunra’s™ Global Library recordings, or can be set manually.</p> <p>The imported profiles are recordings of mobile conditions between two points. These recording files are stored in the Shunra Global Library which is a regularly updated, pre-populated set of more than 15 million recorded real-world data points of point-to-point network conditions recorded around the world.”</p> <p><b>HP Network Virtualization for Mobile, Shunra vCat for Mobile Manual, Page 19, Ex. C.</b></p> <p>In the From-To, select the Mobile and Server locations, such as the name of a city or state.”</p>  <p><b>HP Network Virtualization for Mobile, Shunra vCat for Mobile Manual, Page 19-20, Ex. C.</b></p> <p>“APE — Best Practices</p>

**Claim 3, U.S. Pat. No. 9,298,864**

**Discovery:** identify and record real-world infrastructure and network conditions, business processes, application topology and deployment scenarios.

Pre-recorded library of global mobile and broadband **network profiles** enables rapid testing of mobile applications.

Pre-recorded **network profiles** for emulating typical mobile and broadband network conditions between major global cities.”

Built-in **MySQL database stores** thousands of **network profiles**.”

**Shunra NetworkCatcher, Page 2, Ex. F.**

## Claim 8, U.S. Pat. No. 9,298,864

Claim Element	Evidence of Infringement
<p>The system of claim 1, wherein the software is further configured to <b>create one or more scenarios</b> that include <b>scripts that impact</b> either the performance of the application, or the network, or both.</p>	<p>LoadRunner is further configured to create one or more scenarios that include scripts for testing the application.</p> <p>“Because mobile network conditions are dynamic and vary by carrier, location, and time of day, it is essential for testing environments to accurately recreate <b>multiple mobile network scenarios</b> in order to <b>analyze app performance</b> and determine how <b>network conditions</b> affect different <b>mobile users</b>. The multi-flow capability in HP Network Virtualization for Mobile allows you to define a <b>mobile test scenario</b> that simultaneously emulates multiple user locations, each with its own unique set of <b>virtualized mobile network conditions</b>.”</p> <p><b>HP Network Virtualization for Mobile, Page 4, Ex. B.</b></p> <p><b>“LoadRunner Terminology</b></p> <ul style="list-style-type: none"> <li>• <b>Scenario.</b> A <b>scenario</b> is a <b>sequence of events</b> that <b>emulate</b> the <b>hypothetical actions</b> of <b>real users</b> on your <b>application</b>.</li> <li>• <b>Vusers.</b> In the <b>scenario</b>, LoadRunner replaces real users with virtual users or Vusers. While a workstation accommodates only a single human user, many Vusers can run concurrently on a single workstation. In fact, a scenario can contain tens, hundreds, or even thousands of Vusers.</li> <li>• <b>Vuser Scripts.</b> The <b>actions</b> that a <b>Vuser performs</b> during the <b>scenario</b> are described in a <b>Vuser script</b>. When you run a <b>scenario</b>, each Vuser <b>executes a Vuser script</b>. The <b>Vuser scripts</b> include functions that measure and <b>record</b> the <b>performance of your application's components</b>.</li> <li>• <b>Controller.</b> You use the LoadRunner Controller to <b>manage</b> and <b>maintain your scenarios</b>. Using the Controller, you control all the Vusers in a <b>scenario</b> from a single workstation.</li> <li>• <b>Load Generator.</b> When you execute a <b>scenario</b>, the <b>Controller distributes</b> each Vuser in the <b>scenario</b> to a load generator. The load generator is the machine that executes the <b>Vuser script</b>, enabling the Vuser to emulate the actions of a human user.</li> </ul>

**Claim 8, U.S. Pat. No. 9,298,864**

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|--|--|
|  | <ul style="list-style-type: none"><li>• Performance analysis. Vuser scripts include functions that measure and record system performance during load-testing sessions. During a scenario run, you can monitor the network and server resources. Following a scenario run, you can view performance analysis data in reports and graphs.”</li></ul> |
|--|--|

**Micro Focus LoadRunner Help Center, [https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c\\_terms\\_lr.htm](https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm)**

**Claim 9, U.S. Pat. No. 9,298,864**

<p>The system of claim 8, wherein the <b>one or more scenarios</b> define <b>one or more events</b> that occur during the test which includes defining <b>one or more virtual users</b> to <b>simulate real users</b>.</p>	<p>LoadRunner is further configured to define one or more events during the test which includes defining one or more virtual users to simulate real users.</p> <p><b>“LoadRunner Terminology</b></p> <ul style="list-style-type: none"> <li>• <b>Scenario.</b> A <b>scenario</b> is a <b>sequence of events</b> that <b>emulate</b> the <b>hypothetical actions</b> of <b>real users</b> on your <b>application</b>.”</li> </ul> <p><b>Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm</a></b></p> <p><b>“Understanding the HP LoadRunner main components</b></p> <p><b>VuGen (Virtual User generator):</b> In order to <b>simulate transactions</b>, it is necessary to create <b>scripts for it</b>. The HP LoadRunner <b>scripting tool</b> is called <b>VuGen</b>...Controller and Load Generator: Once <b>transactions are ready to be simulated</b>, you will need to <b>create</b> the <b>user scenarios and execute them</b>. The <b>user scenarios</b> will <b>simulate the users’ behavior within the application</b>. For example:</p> <p>The component to execute the <b>transactions</b> based on <b>users’ behavior</b> is called the <b>controller</b>. Using the controller, you can control all the <b>virtual users (known as Vuser)</b> <b>in a scenario</b> from a single workstation...Most of the Vuser operate as a single thread process, enabling a single server or computer to <b>emulate the actions</b> of if <b>several 100 users</b>.”</p> <p><b>Micro Focus LoadRunner Community Home, <a href="https://community.softwaregrp.com/t5/All-About-the-Apps/HP-LoadRunner-Where-do-I-start-VuGen/ba-p/303730#.WxmOD-4vwuV">https://community.softwaregrp.com/t5/All-About-the-Apps/HP-LoadRunner-Where-do-I-start-VuGen/ba-p/303730#.WxmOD-4vwuV</a></b></p>
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**Claim 10, U.S. Pat. No. 9,298,864**

<p>The system of claim 9, wherein the <b>one or more virtual users emulate actions of real user behavior.</b></p>	<p>LoadRunner is further configured to define one or more events during the test which includes defining one or more virtual users to simulate real users.</p> <p><b>“LoadRunner Terminology</b></p> <ul style="list-style-type: none"> <li>• Scenario. A scenario is a sequence of events that <b>emulate the hypothetical actions of real users</b> on your application.”</li> </ul> <p><b>Micro Focus LoadRunner Help Center,</b> <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm</a></p> <p><b>“Understanding the HP LoadRunner main components</b></p> <p>The component to execute the <b>transactions based on users’ behavior</b> is called the <b>controller</b>. Using the controller, you can control all the <b>virtual users (known as Vuser) in a scenario</b> from a single workstation...Most of the Vuser operate as a single thread process, enabling a single server or computer to <b>emulate the actions</b> of if <b>several 100 users.</b>”</p> <p><b>Micro Focus LoadRunner Community Home,</b> <a href="https://community.softwaregrp.com/t5/All-About-the-Apps/HP-LoadRunner-Where-do-I-start-VuGen/ba-p/303730#.WxmOD-4vwuV">https://community.softwaregrp.com/t5/All-About-the-Apps/HP-LoadRunner-Where-do-I-start-VuGen/ba-p/303730#.WxmOD-4vwuV</a></p> <p>“After the recording, VuGen generates <b>various functions</b> that <b>define the actions performed</b> during the recording session. VuGen inserts these <b>functions</b> into the VuGen editor to create a basic Vuser script. Instead of having to manually program the application's API function calls to the server, VuGen automatically generates <b>functions</b> that <b>model and emulate real world situations.</b>”</p> <p><b>Micro Focus LoadRunner Help Center,</b> <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></p>
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**Claim 11, U.S. Pat. No. 9,298,864**

<p>The system of claim 10, wherein the <b>actions</b> that are performed by <b>one or more virtual users</b> are recorded to <b>generate a script</b> which can be modified to <b>emulate real user behavior</b>.</p>	<p>LoadRunner is further configured to record the actions of one or more virtual users to generate a script to emulate real user behavior.</p> <p><b>“The Inside story on HPE LoadRunner</b></p> <p>With an intuitive record and playback mechanism, including the patented TruClient technology, HPE LoadRunner reproduces real business processes that a <b>user would perform in production</b>. These <b>scripts</b> can then be easily <b>modified to emulate real user behavior</b>.</p> <p>LoadRunner then emulates <b>hundreds</b> or <b>thousands of concurrent virtual users</b>, with minimal hardware, to apply accurate workloads to any application. By leveraging HPE Network Virtualization and HPE Service Virtualization, you can eliminate and control unknown variables and isolate performance risks.”</p> <p><b>HPE LoadRunner Data Sheet, <a href="http://www8.hp.com/us/en/software-solutions/loadrunner-load-testing/index/resource/hpe-loadrunner-data-sheet/2081333/">http://www8.hp.com/us/en/software-solutions/loadrunner-load-testing/index/resource/hpe-loadrunner-data-sheet/2081333/</a></b></p> <p>“You use <b>VuGen</b> to develop a <b>Vuser script</b> by <b>recording a user performing</b> typical business processes on a client application. <b>VuGen records the actions that you perform</b> during the recording session, recording only the activity between the client and the server. During recording, VuGen monitors the client and traces all the requests sent to and received from the server.</p> <p>During recording, VuGen monitors the client and traces all the requests sent to and received from the server.”</p> <p><b>Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></b></p> <p>“After the recording, VuGen generates <b>various functions</b> that <b>define the actions performed</b> during the recording session. VuGen inserts these <b>functions</b> into the VuGen editor to create a basic <b>Vuser script</b>. Instead of having to manually program the application's API function calls to the server, VuGen automatically generates <b>functions</b> that <b>model and emulate real world situations</b>.”</p> <p><b>Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></b></p>
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**Claim 11, U.S. Pat. No. 9,298,864****“Mobile application testing**

HPE LoadRunner is the most complete solution for mobile application performance testing; including Mobile Web, Native and Hybrid applications. The **Mobile TruClient** protocol supports the rapid testing of browser-based mobile applications, and the **Mobile Applications** protocol provides support for **native, Web and Hybrid applications**. HPE solutions for **mobile testing** can be used to test mobile applications against any platform and OS. **HPE LoadRunner seamlessly integrates** with **Network Virtualization** enabling **realistic network conditions** during each test.

**Mobile Application recording options**

When it comes to Mobile testing, one method does not fit all. Whether you have access to a physical device, application or device emulator, or traffic capture from any available Mobile device cloud; the methods used for capturing application usage will vary with each deployment model. That is why HPE LoadRunner includes multiple methods for recording **Mobile application scripts**, to meet the needs of any Mobile development project. **Virtual User Generator** supports the following Mobile application **scripting methods**:

- Server-side traffic capture
- PCAP traffic recording
- **Mobile Device Emulator**
- Proxy recording
- **TruClient Mobile** (for mobile-web applications)

The **HPE LoadRunner Mobile Recorder** is also available on **Google Play** for capturing traffic directly on an **Android device**.”

**HPE LoadRunner Data Sheet**, <http://www8.hp.com/us/en/software-solutions/loadrunner-load-testing/index/resource/hpe-loadrunner-data-sheet/2081333/>

## Claim 12, U.S. Pat. No. 9,298,864

<p>The system of claim 11, wherein the <b>scripts</b> include <b>one or more functions</b> that measure and record performance of either the <b>application</b>, or the <b>network</b>, or both.</p>	<p>Wherein the scripts include one or more functions that measure and record performance of either the application or the network.</p> <p><b>“LoadRunner Terminology</b></p> <ul style="list-style-type: none"> <li>• <b>Scenario.</b> A <b>scenario</b> is a <b>sequence of events</b> that <b>emulate</b> the <b>hypothetical actions</b> of <b>real users</b> on your <b>application</b>.</li> <li>• <b>Vuser Scripts.</b> The <b>actions</b> that a <b>Vuser performs</b> during the <b>scenario</b> are described in a <b>Vuser script</b>. When you run a <b>scenario</b>, each Vuser executes a <b>Vuser script</b>. The <b>Vuser scripts</b> include <b>functions that measure and record the performance</b> of your <b>application's components</b>.</li> <li>• <b>Performance analysis.</b> <b>Vuser scripts</b> include <b>functions</b> that measure and record <b>system performance during load-testing sessions</b>. During a <b>scenario run</b>, you can <b>monitor the network</b> and <b>server resources</b>. Following a <b>scenario run</b>, you can view performance analysis data in reports and graphs.”</li> </ul> <p><b>Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Controller/c_terms_lr.htm</a></b></p> <p>“After the recording, VuGen generates <b>various functions</b> that <b>define the actions performed</b> during the recording session. VuGen inserts these <b>functions</b> into the VuGen editor to create a basic <b>Vuser script</b>. Instead of having to manually program the application's API function calls to the server, <b>VuGen</b> automatically generates <b>functions</b> that <b>model</b> and <b>emulate real world situations</b>.”</p> <p><b>Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></b></p>
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## Claim 20, U.S. Pat. No. 9,298,864

Claim Element	Evidence of Infringement
<p>A method for <b>emulating an application</b> playing on an application player in each of <b>a plurality of mobile devices</b>, the method comprising:</p>	<p>Micro Focus TruClient Native Mobile provides a way to emulate mobile applications on both Android and iOS mobile devices.</p> <p>“The new <b>TruClient – Native Mobile protocol provides a novel way</b> to record and replay <b>native mobile applications on both Android and iOS devices</b>. The protocol enables the developer or DevOps engineer to record user interactions on the mobile application and create a TruClient script. This script can be enhanced using standard TruClient functionality including parameterization, transactions and JavaScript coding.”</p> <p><b>Micro Focus Introduction to LoadRunner’s new TruClient – Native Mobile protocol,</b>  <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU</a></p> <p>“After the recording, VuGen generates various functions that define the actions performed during the recording session. VuGen inserts these functions into the VuGen editor to create a basic Vuser script. Instead of having to manually program the application's API function calls to the server, VuGen automatically generates functions that model and <b>emulate real world situations</b>.”</p> <p>— — <b>Micro Focus LoadRunner Help Center</b>, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></p>
<p>retrieving <b>characteristics, indicative of performance</b>, for each of the <b>mobile devices</b>;</p>	<p>Micro Focus TruClient Native Mobile retrieves mobile device characteristics indicative of performance and provides data of the application’s performance for a mobile device.</p> <p>“This protocol is meant for end-user <b>performance testing</b>. Together with the existing mobile protocols, <b>it completes the LoadRunner mobile performance testing suite</b>...</p> <p>Let’s discuss the ‘end-user performance’ test phase. This <b>new protocol provides data of the application’s performance</b> on a real device in different conditions.”</p> <p><b>Micro Focus Introduction to LoadRunner’s new TruClient – Native Mobile protocol,</b>  <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU</a></p> <p><b>“Lab management</b></p> <p>Create and manage <b>device groups</b> and access permissions, schedule device reservations, get full control over a device, including system apps and remote restarts. Record and replay interactions, events and gestures on any app on any device or emulators.</p>

**Claim 20, U.S. Pat. No. 9,298,864**

Build a lab of mobile devices and emulators, allowing your team to reserve and control them remotely.

Extend your lab with public devices to enable a greater variety of models and operating systems, and allow you to select a device by its capabilities.”

**MOBILE CENTER** 1. DEVICE 2. APPS 3. TEST OPTIONS SAVE AND CLOSE

**CREATE RULE**

Choose the minimal capabilities required for your test. In runtime, you will be assigned an appropriate device.

OS (required) ☐ Android ☐ iOS ☐ Windows Phone

OS Version: Any (dropdown)

Manufacturer & Model:  Enter manufacturer and/or model. To match an exact string, use double quotes. For example, "Apple iPad mini 4".

No devices match your rule? [Replay your test on an Amazon device.](#)

Preview of applicable devices: 6/6 Devices

OS	Manufacturer & Model	OS Version	Form Factor	Lab
Apple	Apple iPad mini 2G (WiFi)	8.3	Tablet	Mobile Center Lab
Apple	Apple iPhone 6s	9.0.1	Phone	Mobile Center Lab
LGE	LGE Nexus SX	7.1.1	Phone	Mobile Center Lab
LGE	LGE Nexus SX	8.0.0	Phone	Mobile Center Lab
samsung	samsung GT-I919S	4.4.2	Phone	Mobile Center Lab
samsung	samsung SM-G920i	6.0.1	Phone	Mobile Center Lab

Micro Focus Mobile Center, <https://software.microfocus.com/en-us/products/mobile-testing/overview>

## Claim 20, U.S. Pat. No. 9,298,864

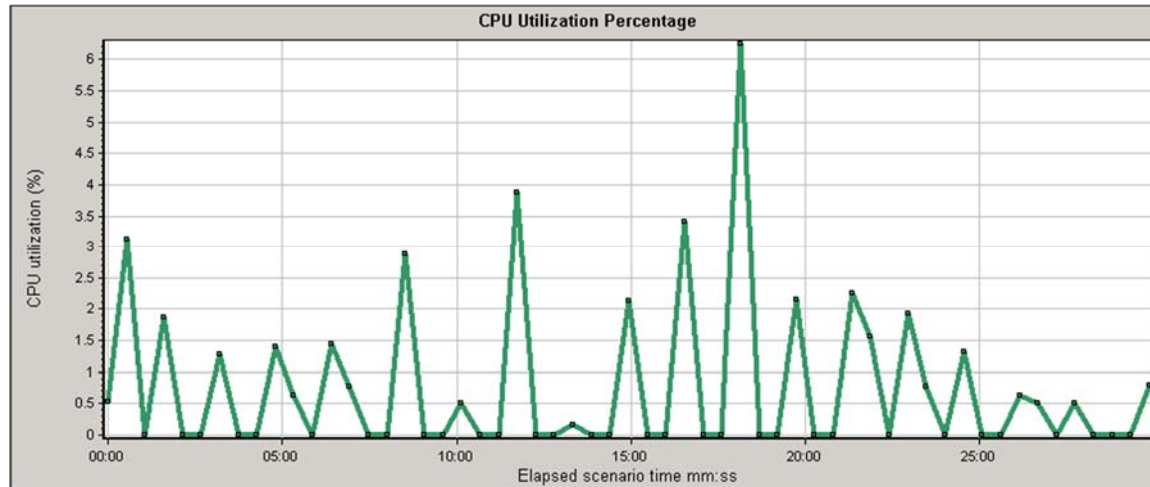
<p>emulating each of the mobile devices in real time using respective models running on a processor extrinsic to the mobile devices, wherein each of the models is based on the retrieved characteristics;</p>	<p>You can use TruClient to measure and monitor the device performance during the test run based on the device characteristics.</p> <p>“You can use TruClient transactions to measure the time that a set of steps (or a single step) complete. In addition, you can monitor device performance measurements during the test run. These measurements include:</p> <ul style="list-style-type: none"> <li>• CPU consumed on the device</li> <li>• Free memory on the device</li> <li>• Memory consumed by the application.”</li> </ul> <p>Micro Focus Corporate Website, Introduction to LoadRunner’s new TruClient – Native Mobile protocol, <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU</a></p>
<p>playing the application in real time using the application player within each of the models;</p>	<p>“The new TruClient – Native Mobile protocol provides a novel way to record and replay native mobile applications on both Android and iOS devices. The protocol enables the developer or DevOps engineer to record user interactions on the mobile application and create a TruClient script.”</p> <p>Micro Focus Introduction to LoadRunner’s new TruClient – Native Mobile protocol, <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU</a></p> <p><b>“Mobile Application Testing</b></p> <p>LoadRunner is the most complete solution for mobile application performance testing; including Mobile Web, Native and Hybrid applications. The TruClient—Mobile Web protocol supports the rapid testing of browser-based mobile applications, and the TruClient—Native Mobile protocol provides support for native, Web and Hybrid applications. Micro Focus solutions for mobile testing can be used to test mobile applications against any platform and OS. LoadRunner seamlessly integrates with Network Virtualization enabling realistic network conditions during each test.”</p> <p>Micro Focus LoadRunner Data Sheet, Page 3, Ex. G.</p>

**Claim 20, U.S. Pat. No. 9,298,864**

<p>monitoring the application playing in each of the models to determine resource utilization information by the application for each of the mobile devices;</p>	<p>“You can use TruClient transactions to measure the time that a set of steps (or a single step) complete. In addition, you can monitor device performance measurements during the test run. These measurements include:</p> <ul style="list-style-type: none"> <li>• CPU consumed on the device</li> <li>• Free memory on the device</li> <li>• Memory consumed by the application.”</li> </ul> <p>Micro Focus Introduction to LoadRunner’s new TruClient – Native Mobile protocol,  <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGIO4vwuU</a></p>						
<p>and displaying the resource utilization information for at least one of the mobile devices.</p>	<p>TruClient then displays the resource utilization for the mobile device characteristic.</p> <p>“TruClient CPU Utilization Percentage Graph</p> <p>This graph displays the percentage of the CPU utilized during the test run for TruClient Native Mobile Vuser scripts.</p> <table border="1"> <tr> <td><b>Purpose</b></td><td>Helps you evaluate the amount of CPU utilized by an application.</td></tr> <tr> <td><b>X-axis</b></td><td>Elapsed time since the start of the scenario run.</td></tr> <tr> <td><b>Y-axis</b></td><td>The percentage of the CPU utilized during the test run.</td></tr> </table>	<b>Purpose</b>	Helps you evaluate the amount of CPU utilized by an application.	<b>X-axis</b>	Elapsed time since the start of the scenario run.	<b>Y-axis</b>	The percentage of the CPU utilized during the test run.
<b>Purpose</b>	Helps you evaluate the amount of CPU utilized by an application.						
<b>X-axis</b>	Elapsed time since the start of the scenario run.						
<b>Y-axis</b>	The percentage of the CPU utilized during the test run.						

**Claim 20, U.S. Pat. No. 9,298,864**

Example: In the following example, the CPU utilization peaked to approximately 6% at 18 minutes into the test run.”



Micro Focus LoadRunner Help Center, [https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui\\_tc\\_CPU\\_graph.htm](https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui_tc_CPU_graph.htm)

**“TruClient Free Memory In Device Graph**

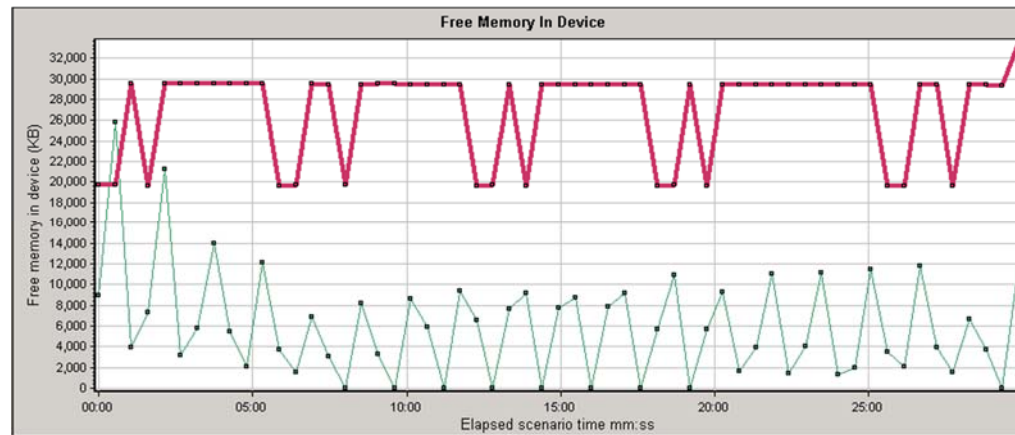
This graph displays the free memory on a mobile device as a function of time, for TruClient Native Mobile scripts.



**Claim 20, U.S. Pat. No. 9,298,864**

<b>Purpose</b>	Helps you evaluate the amount of <b>memory</b> available on the device during the test run.
<b>X-axis</b>	Elapsed time since the start of the scenario run.
<b>Y-axis</b>	The amount of free <b>memory</b> in KBs.

Example: In the following example, the graph shows a free **memory** of over 33 MBs, at 30 minutes into the test run for one of the transactions.”



Micro Focus LoadRunner Help Center, [https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui\\_tc\\_free\\_mem\\_graph.htm](https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui_tc_free_mem_graph.htm)

**“TruClient **Memory** Consumed by Application Graph**

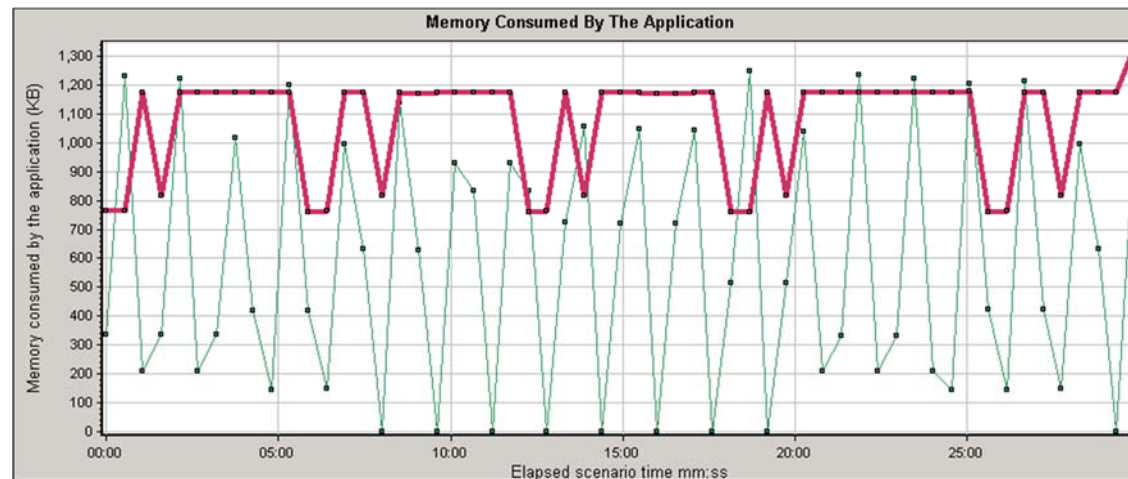
This graph displays the **memory** consumed by the application, as a function of time.

<b>Purpose</b>	Helps you evaluate the amount of <b>memory</b> used by the application.
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**Claim 20, U.S. Pat. No. 9,298,864**

<b>X-axis</b>	Elapsed time since the start of the scenario run.
<b>Y-axis</b>	The <b>memory</b> consumed by the application in KBs.

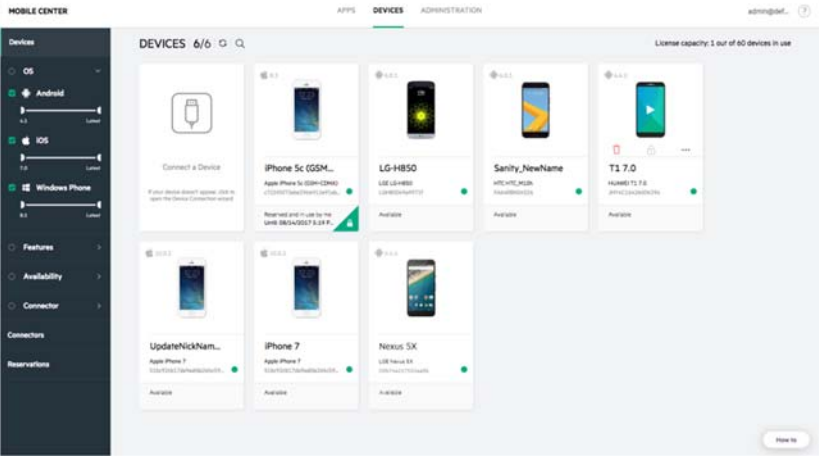
Example: In the following example, the **memory** consumption peaked to 1337 KBs at 30 minutes into the test, for one of the transactions.”



Micro Focus LoadRunner Help Center,

[https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui\\_tc\\_consumed\\_mem\\_graph.htm](https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/Analysis/ui_tc_consumed_mem_graph.htm)

**Claim 29, U.S. Pat. No. 9,298,864**

Claim Element	Evidence of Infringement
<p>A method for <b>emulating an application</b> playing on at least <b>one mobile device</b> comprising:</p>	<p>Micro Focus Mobile Center provides a method for emulating an application to play on a mobile device.</p> <p><b>“Mobile Center Mobile Testing</b></p> <p><b>Micro Focus Mobile Center</b> provides an end-to-end quality lab of <b>real devices</b> and <b>emulators</b>.”</p> <p><b>Micro Focus Mobile Center</b>, <a href="https://software.microfocus.com/en-us/products/mobile-testing/overview">https://software.microfocus.com/en-us/products/mobile-testing/overview</a></p>
<p>receiving instructions to <b>select each said mobile device</b> from a list including <b>characteristics indicative of performance</b> of each said <b>mobile device</b>;</p>	<p><b>“Lab management</b></p> <p><b>Create and manage device groups</b> and access permissions, schedule <b>device reservations</b>, get full control <b>over a device</b>, including system apps and remote restarts. Record and replay interactions, events and gestures <b>on any app</b> on any <b>device</b> or <b>emulators</b>.</p> <p>Build a lab of <b>mobile devices</b> and <b>emulators</b>, allowing your team to reserve and <b>control them remotely</b>.</p> <p>Extend your lab with <b>public devices</b> to enable a greater variety of models and operating systems, and allow <b>you to select a device by its capabilities</b>.”</p> <p><b>Micro Focus Mobile Center</b>, <a href="https://software.microfocus.com/en-us/products/mobile-testing/overview">https://software.microfocus.com/en-us/products/mobile-testing/overview</a></p> 

## Claim 29, U.S. Pat. No. 9,298,864

<p>emulating each said mobile device using a respective model, wherein each said model is based upon the characteristics of a respective said mobile device;</p>	<p>“The new TruClient – Native Mobile protocol provides a novel way to record and replay native mobile applications on both Android and iOS devices. The protocol enables the developer or DevOps engineer to record user interactions on the mobile application and create a TruClient script. This script can be enhanced using standard TruClient functionality including parameterization, transactions and JavaScript coding.”</p> <p><b>Micro Focus Introduction to LoadRunner’s new TruClient – Native Mobile protocol,</b>  <a href="https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGI04vwuU">https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.WxcGI04vwuU</a></p> <p>“After the recording, VuGen generates various functions that define the actions performed during the recording session. VuGen inserts these functions into the VuGen editor to create a basic Vuser script. Instead of having to manually program the application's API function calls to the server, VuGen automatically generates functions that model and emulate real world situations.”</p> <p>— — Micro Focus LoadRunner Help Center, <a href="https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm">https://admhelp.microfocus.com/lr/en/12.56-12.57/help/WebHelp/Content/VuGen/100050_c_vugen_overview.htm</a></p> <p><b>“Lab management</b></p> <p>Create and manage device groups and access permissions, schedule device reservations, get full control over a device, including system apps and remote restarts. Record and replay interactions, events and gestures on any app on any device or emulators.</p> <p>Build a lab of mobile devices and emulators, allowing your team to reserve and control them remotely.</p> <p>Extend your lab with public devices to enable a greater variety of models and operating systems, and allow you to select a device by its capabilities.”</p>
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**Claim 29, U.S. Pat. No. 9,298,864**

**MOBILE CENTER** 1: DEVICE 2: APPS 3: TEST OPTIONS SAVE AND CLOSE

**Choose Capabilities**

**Choose Specific Device**

**CREATE RULE**

Choose the minimal capabilities required for your test. In runtime, you will be assigned an appropriate device.

OS **Required**

☐ Android

☐ iOS

☐ Windows Phone

OS Version

Any

OS Version

**Manufacturer & Model**

Enter manufacturer and/or model

To match an exact string, use double quotes. For example, "Apple iPad mini 4"

**No devices match your rule?**  
Replay your test on an Amazon device.

**Preview of applicable devices** 6/6 Devices

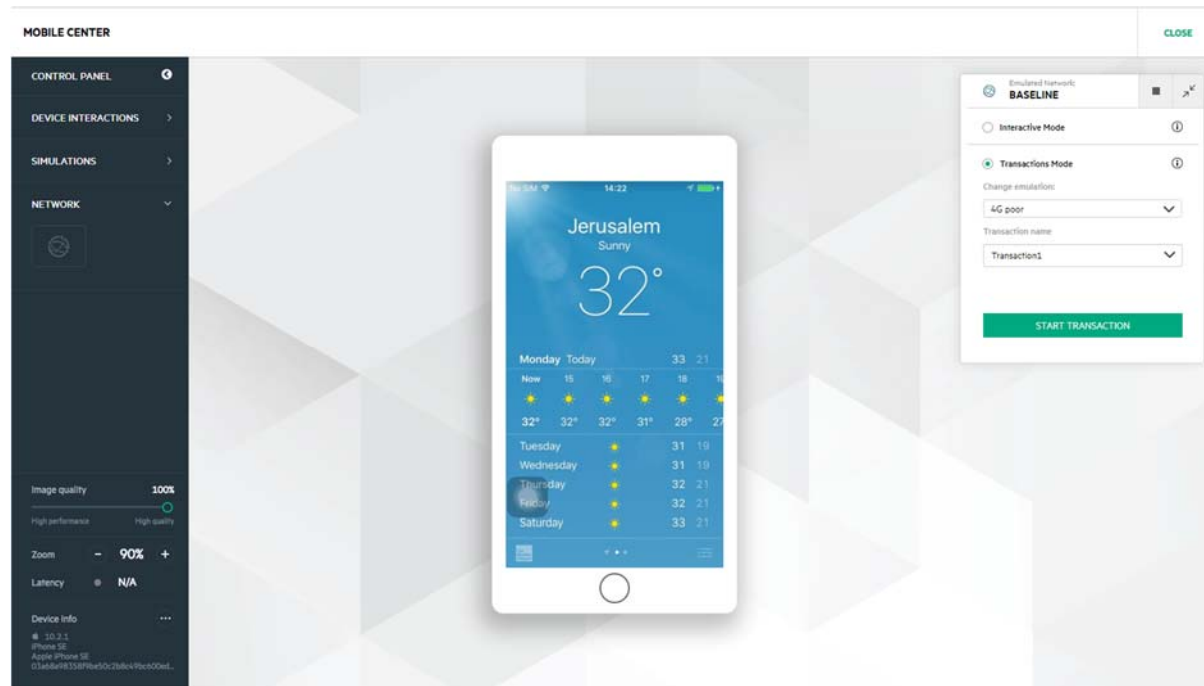
OS	Manufacturer & Model	OS Version	Form Factor	Lab
Apple	Apple iPad mini 2G (WiFi)	8.3	Tablet	Mobile Center Lab
Apple	Apple iPhone 6s	9.0.1	Phone	Mobile Center Lab
LGE	LGE Nexus SX	7.1.1	Phone	Mobile Center Lab
LGE	LGE Nexus SX	8.0.0	Phone	Mobile Center Lab
samsung	samsung GT-I919S	4.4.2	Phone	Mobile Center Lab
samsung	samsung SM-G920I	6.0.1	Phone	Mobile Center Lab

**Micro Focus Mobile Center, <https://software.microfocus.com/en-us/products/mobile-testing/overview>**

## Claim 29, U.S. Pat. No. 9,298,864

playing the application in real time within each said model;

“Control your device remotely and simulate events such as GPS location and network speed changes, and other common events.”



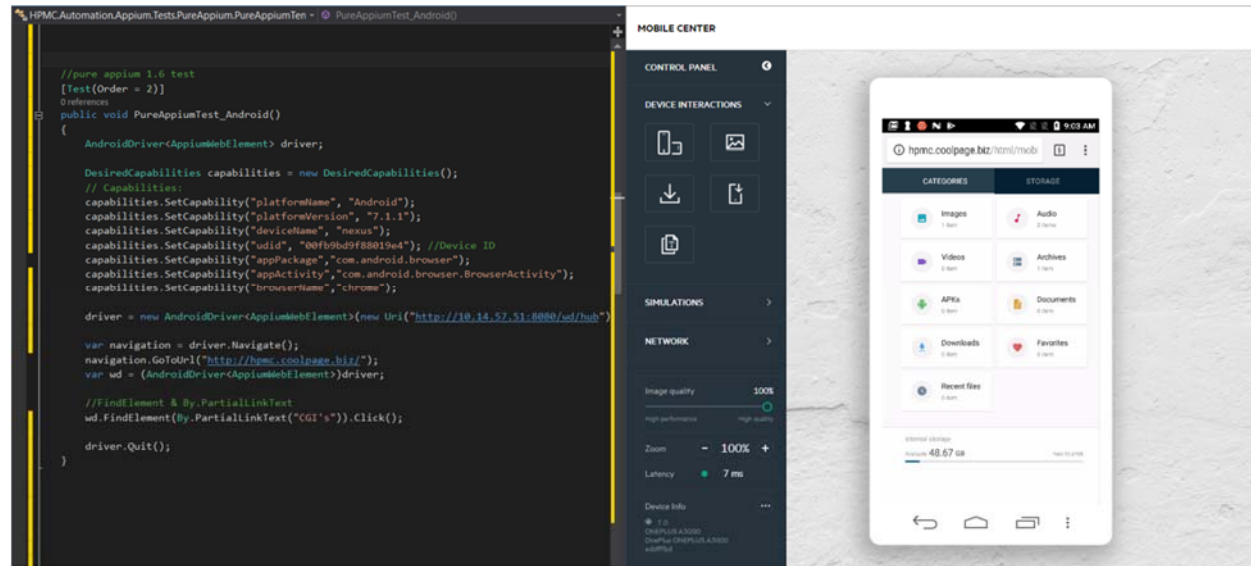
Micro Focus Mobile Center, <https://software.microfocus.com/en-us/products/mobile-testing/overview>

## Claim 29, U.S. Pat. No. 9,298,864

monitoring each said model to determine resource utilization of the application for each said mobile device;

“Live monitoring

Proactively monitor your app from multiple geographies on real device to identify issues before customers see them. Leverage in-app analytics with actionable insights to improve your test effectiveness.”



Micro Focus Mobile Center, <https://software.microfocus.com/en-us/products/mobile-testing/overview>

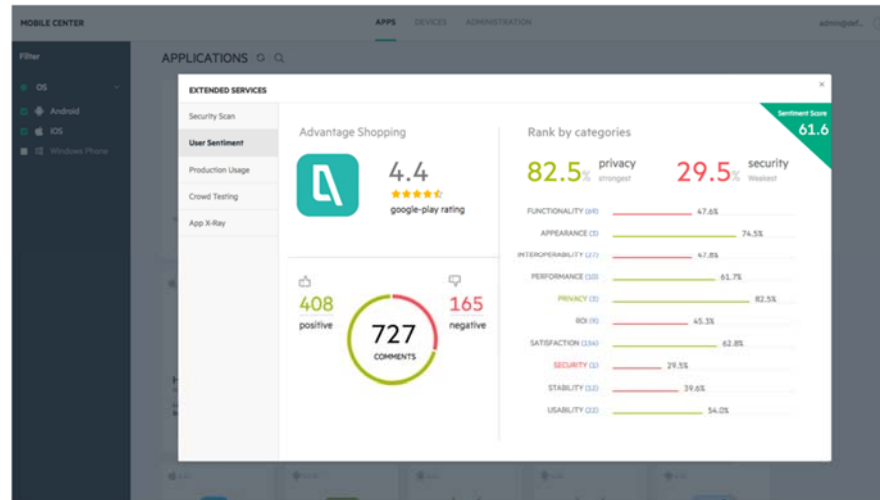
## Claim 29, U.S. Pat. No. 9,298,864

and displaying  
the resource  
utilization  
information.

“Mobile performance optimization

Get an accurate picture of the end-to-end mobile performance. Combine virtual users and real devices, run simple, elastic, and realistic tests from multiple geographies across various real-world network conditions.

Learn how your app scores in the app stores and prioritize your tests accordingly.”



Micro Focus Mobile Center, <https://software.microfocus.com/en-us/products/mobile-testing/overview>

“Our native, in-house support for mobile applications testing, with Mobile Center you take control of your mobile reality, and addresses the challenge of optimizing mobile app quality and user experience throughout the application lifecycle, with the tools you are already familiar with from us. This enables you to accelerate testing on



**Claim 29, U.S. Pat. No. 9,298,864**

real devices, increase coverage, and solve problems before they affect users. Built on native technology, **Mobile Center leverages** our expertise in functional and performance testing, and integrates mobile testing with **Sprinter, Unified Functional Testing, LoadRunner, and Performance Center.**”

**Micro Focus Mobile Center, <https://community.softwaregrp.com/t5/Quality-and-Testing-Blog/New-Service-Pack-for-UFT-12-has-been-just-released/ba-p/250150#.WzagrtVKguV>**

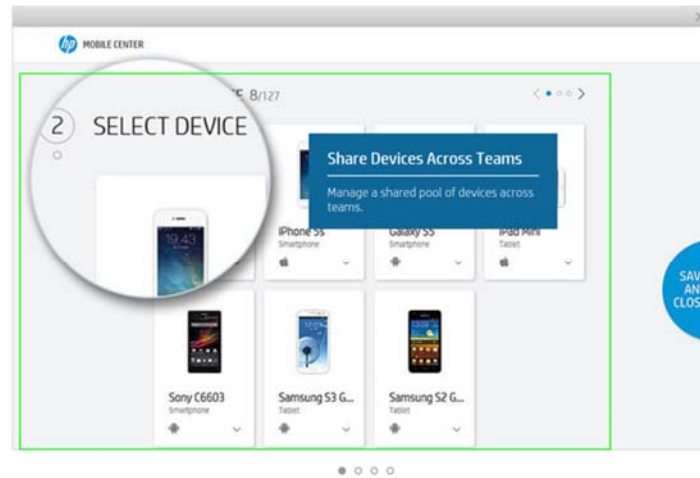
“This **new protocol** provides data of the **application’s performance** on a **real device** in different conditions. You can use TruClient transactions to measure the time that a set of steps (or a single step) complete. In addition, you can **monitor device performance measurements during the test run**. These measurements include:

- **CPU consumed on the device**
- **Free memory on the device**
- **Memory consumed by the application”**

**Micro Focus Mobile Center, <https://community.softwaregrp.com/t5/LoadRunner-and-Performance/Introduction-to-LoadRunner-s-new-TruClient-Native-Mobile/ba-p/269441#.Wxcs2u4vwuU>**

**Claim 29, U.S. Pat. No. 9,298,864**

Mobile Testing Screenshots



Connect your devices to Mobile Center and immediately test your mobile application on real devices. Flexible device management improves team collaboration and velocity.